



Next Generation Wireless Emergency Public Safety Communications Network

Technical Report Outline

DRAFT

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Executive Summary

This section will provide an executive summary of the report. The following narrative is a sample and will be modified to reflect the contents of the actual report.

Radio communications introduction

Radio communications are a vital asset to any public safety agency. Law enforcement and fire agencies rely on radio systems to receive accurate information from their dispatch centers regarding calls for service to their citizens, safeguarding lives and property while protecting the lives of the agencies' personnel. Ambulance services, public works, and emergency management agencies also find radio communications an absolute necessity to hasten emergency response.

Since September 11, 2001, public safety agencies have been encouraged by state and federal planners to improve interoperability among agencies responding to an emergency or disaster. This encouragement came in the form of both written plans and reports and opportunities to apply for grants. For the first time, inter-disciplinary communications have been encouraged, so that fire and police, for example, could communicate with one another better during response to disasters such as the one caused by the attack on the World Trade Center.

Project background

Public safety responders in Snohomish, King, and Pierce Counties frequently engage in joint operations, mutual aid, and other activities that bring them into a neighboring county. Integrated, interoperable communication is an essential tool for avoiding and responding to emergencies efficiently and safely.

There are a number of excellent individual emergency public safety communications systems operating in the region. Even so, there is currently limited interoperability among all first responders due to disparate radio systems and responders do not have a unified public safety network that enables seamless communication throughout the region. In addition, these systems will soon have one or more critical problems that if not addressed, will degrade service and result in increased risks to the public and first responders.



Regardless of the system's life span, imminent replacement decisions in one jurisdiction will influence decisions in other systems, and improving the existing level of interoperability through regional cooperation is necessary to provide dependable service for all system users. Users, owners, and operators of these systems have come together to form the Radio Executive Policy Committee (REPC) and its subcommittees with the goal of determining the best course of action to avoid these risks, meet regional communications requirements, and take advantage of advances in technology.

Recommendations

*This section will summarize **FE's** recommendations for each model:*

- Single three-county network deployment model
- Three single-county systems deployment model

Next steps

This section will summarize the recommended next steps.



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1. Part A - Introduction

1.1 Purpose of this report

FE will provide a narrative describing the purpose of the report. The narrative will reflect the project as defined by the RFP, meetings, and presentations related to the project.

1.2 Project background

FE will provide a narrative describing the project background. This narrative will reflect historical data and from data collected throughout the course of the project. The project background will enable those unfamiliar with the background to understand the extensive efforts that have preceded this project

1.3 Overview of the region

This section will provide an overview of the region, providing descriptions of the counties and the region and maps for illustration.

The region is located in the Puget Sound area of the State of Washington as shown in figure X.



Figure X – Map of Counties and Major Cities (placeholder for outline)



1.3.1 Counties

The following counties are part of the REPC:

- King County
- Pierce County
- Snohomish County

Figure X shows a map of the counties and their major cities.



Figure X – Map of Counties and Major Cities (placeholder for outline)



1.3.2 Demographics

Table X identifies the size of each county, its 2000 census population, and the county seat.

Table X – County demographics

County	Area (square miles)	Population	County seat
King	2,307	1,737,034	Seattle
Pierce	1,806	700,820	Tacoma
Snohomish	2,196	606,024	Everett

1.3.3 Neighboring counties

The following counties form the boundary of the region:

- Thurston County
- Lewis County
- Kitsap County
- Jefferson County
- Yakima County
- Kittitas County
- Chelan County

Figure X shows a map of the counties which form the boundary of the region

Figure X- Neighboring counties map (to be created)



2. Methodology

***FE** will describe the methodologies utilized for the development of the report. The content will enable the reader of the report to understand the steps taken to develop the information and recommendations found in this document. The following represents a brief description of the tasks and analyses **FE** will perform to produce the conclusions and recommendations for final version of this report.*

- 1. In order to facilitate the completion of the task requiring **FE** to review existing system documentation, **FE** created and supplied a list of relevant existing system information to the CPM that could be useful in the development of this report. The CPM distributed this list to the project participants and requested they supply the information. It may be necessary to contact various agencies or points-of-contact to acquire information on the list not supplied or other appropriate information prior to completing the first draft of this report.*
- 2. **FE** will develop a data collection plan in collaboration with the CPM and the PSC. This data collection plan will detail the agencies to be interviewed, the time and dates available for interviews, and the location where the interviews will be held. The data collection phase of the project is designed to provide stakeholders an opportunity to provide input to the report. Discussions are ongoing with CPM regarding the community resources to facilitate data collection activities. Preliminary discussions indicate the CPM will coordinate one location in each county for conducting stakeholder interviews.*
- 3. A series of questions designed to capture input relevant to the project goals and objectives are under development. **FE** will submit the questionnaire to the CPM and PSC for review and approval. The approved questionnaire will serve as the basis for structured face-to-face interview sessions with stakeholders. The same questionnaire will also be available on-line to facilitate data collection for those not involve in the face-to-face interview sessions.*
- 4. From the data collected, **FE** will validate the needs and preferences of stakeholders throughout the region and complete an assessment of local conditions and requirements potentially affecting the design, construction, operation, maintenance, performance, costs, of a Next Generation Network for the region.*





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5. ***FE** will identify and evaluate viable solutions that can potentially meet the region's public safety communications requirements for the Next Generation Network and assess the relative merits and costs of each solution, including those available today and those likely to be available in the next few years.*
6. *Based on the findings, **FE** will recommend a specific solution that best meets the requirements in a cost-efficient manner for the next fifteen to twenty years.*
7. ***FE** will describe the assumptions, if any, made in preparing this report.*

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3. Single three-county network deployment model

The single three-county network deployment model involves King, Pierce, and Snohomish Counties sharing a common radio system built out across the region. The following subsections describe in detail potential solutions for this deployment model.

3.1 Selected Solution (A)

This section will provide an overview of the selected solution. The sections to follow will provide the appropriate narrative, data, tables, or drawings as appropriate

3.1.1 Overview

FE will provide an overview to enable the reader to obtain a high-level understanding of the selected solution. It will entail a basic description of the selected solution and a summary of the characteristics and attributes associated with the selected solution,

3.1.2 Examples of usage

FE will provide the reader with examples of usage of the selected solution. The examples, to the degree possible, will reflect a list of other jurisdictions of comparable size (area, terrain, number of radios, and uses) that have used the selected solution in their Public Safety Communications systems;

3.1.3 Strengths and weaknesses

FE will provide a narrative describing the strengths and weaknesses of the selected solution relative to the evaluation criteria establish by the Project Steering Committee. FE plans to provide a table similar to table X shown below to summarize these characteristics for the reader. Table X - Strengths and Weaknesses

Strengths	Weaknesses



3.1.4 Operability

FE will provide information in this section to describe how the characteristics and attributes of the selected solution enables stakeholder to achieve operability.

3.1.5 Interoperability

FE will provide information in this section to describe how the characteristics and attributes of the selected solution enable stakeholders to achieve operability.

3.1.6 Expandability / Scalability

FE will report on the scalability and capacity for the selected solution. FE will discuss how easy or how difficult it may be for the selected solution to scale in order to meet the future capacity requirements as identified during the project. Public Safety Radio GOS calculations help the user to be aware of how often a user may have to wait to access a given radio system. The intent will be to enable the reader to understand how well the selected solution will support the anticipated traffic. FE will provide high-level Grade of Service (GOS) calculations with supporting narratives to explain the calculations. Any assumptions used in these calculations will also be included. FE is providing an example layout of a GOS calculation table X below.

Table X – Grade of Service

Grade of Service capacity calculations	
Quantity of mobile radios planned for the county	radios
Quantity of portables radios planned for the county	radios
Total quantity of user radios for the county	radios
Quantity of county and local radios on the site	radios
Excess capacity required (based on data of neighboring county use)	radios
Quantity for capacity calculations	radios
Channels needed to maintain less than 1% GOS	channels
Calculated GOS for the above quantities	% GOS



3.1.7 Coverage

FE will provide supporting narrative and coverage prediction maps as appropriate to the selected solution. Figure X represents a sample propagation study.

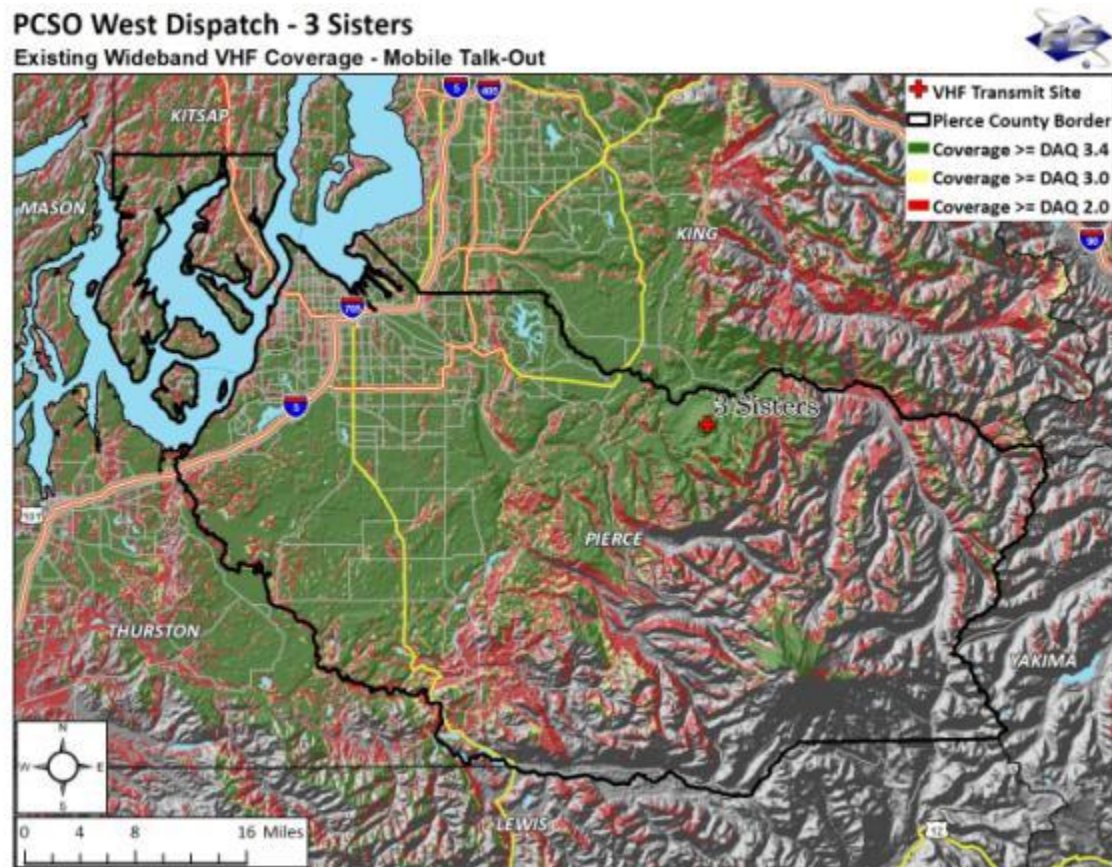


Figure X – Coverage prediction map

Table X – Coverage prediction

Coverage type	Percentage of county area covered
Mobile Talk-Out coverage	%



3.1.8 Spectrum requirements

***FE** will provide the reader information regarding the amount and type of spectrum required for the selected solution. In order to determine if spectrum is available to implement the selected solution, **FE** will perform a gap analysis comparing the spectrum to the spectrum available in the Region. **FE** will provide recommendations for how to fill the gap if possible.*

3.1.9 Basic equipment required

***FE** will provide the reader information a description of the basic equipment required for the selected solution. This section will include information such as the number of tower sites required to meet the coverage criteria, the type of backhaul that is proposed to support the core network, and the user interface equipment that will be needed.*

3.1.10 Standards associated with the solution

*If applicable, **FE** will provide information associated with standards associated with the selected solution. Examples of standards are Project 25, Terrestrial Trunked Radio (TETRA), and Digital Mobile Radio (DMR).*

3.1.11 Open vs. Proprietary status

***FE** will include information regarding the open or proprietary status of the selected solution. This will include discussions related to the impact of the status on stakeholders, implementation, and operation of the selected solution.*

3.1.12 Over-the-air protocol/transport mechanism(s)

***FE** will describe the over-the-air (OTA) protocol(s)/transport mechanisms used by the selected solution. Typical examples of protocols used by land mobile radio solutions may include frequency division multiple access (FDMA) or time division multiple access (TDMA) technologies. Other existing technologies may be used and still others are under development. **FE** will provide information appropriate to the selected solution in this section.*



3.1.13 Backhaul

FE will describe the backhaul requirements for the selected solution in this section. Typical backhaul technologies employed may include leased radio tie line (RTL) circuits, T-1 digital circuits or optical fiber circuits from a local commercial provider. Other backhaul technologies used may include licensed and unlicensed microwave radio systems. The appropriate information for the selected technology will be included in this section.

3.1.14 Implementation considerations

FE will provide information to the reader to assist them with understanding the considerations and high-level factors known to affect implementation of the selected solution. There are challenges and consideration regardless of the selected solution. Typically, the focus is on the actual installation of the equipment. Often overlooked is the plan for transition or migration and the need to maintain functionality and interoperability during this period. This section will address these issues as well as others such as site acquisition, site development, backup power, HVAC, and permitting.

3.1.15 Other relevant attributes and considerations

This section to include other relevant attributes and considerations for each selected solution as identified during the project execution.

3.1.16 Network operational security model

*Maintaining security with the complex radio networks of today require much more planning than with legacy radio networks. In this section, **FE** will discuss appropriate network operational security models for the selected solution. The discussion will highlight security considerations such as system architecture, implementation, access and operation of the selected solution.*

3.1.17 Data and voice service management model

*Management of data and voice services for land mobile radio systems will vary depending on the selected solution. In this section, **FE** will provide data and voice service management models appropriate to the selected solutions. The discussion will highlight each model and show which model is best for a given selected solution.*



3.1.18 Identified Risk mapping

*For each risk identified during the project, **FE** will provide information to enable the reader to understand the various risks associated with each solution. The intent of this information will be to assist the reader in understanding the impact of the risk to the selected solution and the stakeholders. **FE** will provide a mapping between each selected solution and each risk identified during the project effort.*

3.1.19 Problem statement mapping

*This section will discuss how each selected solution addresses each problem in the problem statement provided by the county. Tasks performed during the project will enable **FE** to validate the problem statement. For each problem validated, **FE** will provide narrative to show the relationship between the selected solutions and the validated problem. In addition to the supporting narrative, **FE** will provide a table similar to table X below.*

3.1.20 High-level Rough Order of Magnitude (ROM) costs

***FE** will provide information to assist the reader in understanding the rough order of magnitude (ROM) costs associated with the selected solution. The ROM costs will address the Total Cost of Ownership over the estimated lifecycle of the solution. The costs of main components will be separately broken out; The ROM costs will be presented as follows:*

- *One of these components shall be a typical site including the costs for site acquisition, permitting, the generator, HVAC, battery back-up, and other costs separately broken out.*
- *Annual Cost of Ownership, including the costs of main components, i.e., year 1, year 2, year 3, ...;*
- *Costs assuming the systems are funded and constructed in a single build effort;*
- *Costs assuming the systems are operated by a single entity; and*
- *Cost saving achievable by using existing government assets including but not limited to, sites, towers, installed optical fiber, microwave, etc.*
- *Network operations and management*
- *Ongoing maintenance and support considerations*



3.2 Selected Solution (B)

Same subheadings as used for 3.1

3.3 Selected Solution (C)

Same subheadings as used for 3.1

3.4 Selected Solution (D)

Same subheadings as used for 3.1

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4. Three single-county systems deployment model

***FE** will use the same approach for this model as used in Sections 3 for the single three-county network deployment model.*

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5. Part B – Answers to questions in Attachment M of the contract

*As instructed in the contract, **FE** will provide answers to questions in Attachment M of the Contract for each deployment mode in this section.*

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6. Recommendations

6.1 Single three-county network deployment model

***FE** will describe rationale for the recommendation and provide a list of other jurisdictions of comparable size that have used the recommended solution. **FE** will provide a statement of the specific security measures at remote sites and the costs associated along with a list of assumptions made in completing this section.*

6.2 Three single-county systems deployment model

***FE** will provide use the same approach as used in Section 6.1 for the single three-county network deployment model. The recommendation may differ for each county.*



7. Next steps

Describe the next steps the REPC should take in determining a deployment model and developing an implementation schedule.

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Appendix A – Radio coverage computer modeling

Provide the specifics of the parameters used for coverage modeling in tabular format.

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Appendix X

Insert other appendices as needed.

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